

AMENDMENTS TO THE CLAIMS

1 1. (Canceled).

1 2. (Currently Amended) A method for managing changes in a computer system, the

2 method comprising the steps of:

3 storing, in a storage space, undo information for removing changes that are being

4 made to data by a plurality of entities, wherein application of the undo

5 information returns the data to which the changes were made to a state of the

6 data that existed prior to the changes, wherein the undo information for each

7 entity of the plurality of entities is stored in a segment of a plurality of

8 segments within said storage space;

9 monitoring usage of the storage space by the entities;

10 wherein each segment of the plurality of segments is a partition of said storage space,

11 and is pre-allocated for storing undo information for entities to which that

12 segment will be assigned;

13 wherein said step of storing undo information includes at least assigning each entity

14 to a segment for storing the undo information of the entity; and

15 automatically adjusting at least one of the number of segments in the plurality of

16 segments, and the sizes of the plurality of segments, based on the usage.

1 3. (Currently Amended) The method of Claim 54, further comprising the steps of:

2 establishing a maximum amount of the storage space area; and

preventing a sum of the sizes of the plurality of segments from exceeding the
maximum amount of the storage ~~space~~ area.

4. (Previously Presented) A method for managing changes in a computer system, the
method comprising the steps of:

storing, in a storage space, undo information for removing changes that are being
made to data by a plurality of entities, wherein application of the undo
information returns the data to which the changes were made to a state of the
data that existed prior to the changes, wherein the undo information for each
entity of the plurality of entities is stored in a segment of a plurality of
segments within said storage space;

wherein each segment of the plurality of segments is a partition of said storage space,
and is pre-allocated for storing undo information for entities to which that
segment will be assigned;

monitoring usage of the storage space by the entities; and

automatically adjusting at least one of the number of segments in the plurality of
segments and the sizes of the plurality of segments based on the usage;

wherein said step of monitoring usage further includes at least the step of monitoring
usage in each period of time for a series of periods of time, and the step of
automatically adjusting is based at least on a comparison between a usage of a
first period of time and a usage of a second period of time.

5. (Original) The method of Claim 4, said step of automatically adjusting the plurality of
segments further comprising the steps of:

3 determining whether usage has decreased over a predetermined time based at least in
4 part on the usage in one or more periods of time of the series of periods of
5 time; and
6 if usage has decreased over the predetermined time, then shrinking a sum of the sizes
7 of the plurality of segments.

1 6. (Original) The method of Claim 5, said shrinking including deleting a segment from
2 the plurality of segments.

1 7. (Original) The method of Claim 4, said step of automatically adjusting the plurality of
2 segments further comprising the steps of:

3 determining whether usage has decreased over a predetermined time based at least in
4 part on the usage in one or more periods of time of the series of periods of
5 time; and
6 if usage has decreased over the predetermined time, then
7 determining whether a first amount of storage space allocated to a first
8 segment of the plurality of segments is being used by a first entity
9 storing undo information in the first segment, and
10 if the first amount is not being used by the first entity, then de-allocating the
11 first amount from the first segment.

1 8. (Original) The method of Claim 7, said step of automatically adjusting the plurality of
2 segments further comprising the steps of:
3 determining whether de-allocating the first amount leaves an amount allocated to the
4 first segment that is less than a predetermined minimum amount; and

5 if de-allocating the first amount leaves less than the predetermined minimum amount,
6 then deleting the first segment.

1 9. (Canceled).

1 10. (Currently Amended) The method of Claim 54, said step of automatically adjusting

2 further comprising the steps of:

3 determining whether first conditions are satisfied; and

4 if the first conditions are satisfied, forming a new segment to store undo information

5 for a new entity; wherein the first conditions include that at least a first

6 amount of the storage ~~space~~ area is not allocated to any segment of the

7 plurality of segments.

1 11. (Previously Presented) The method of Claim 54, said step of automatically adjusting

2 further comprising the steps of:

3 determining whether first conditions are satisfied; and

4 if the first conditions are satisfied, forming a new segment to store undo information

5 for a new entity, wherein the first conditions include that every segment of the

6 plurality of segments stores undo information for at least one entity of the

7 plurality of entities.

1 12. (Previously Presented) The method of Claim 2, said step of storing undo information

2 further comprising the steps of:

3 determining whether a first segment of the plurality of segments is not storing undo

4 information for the plurality of entities; and

5 if the first segment is not storing the undo information for the plurality of entities,
6 storing undo information for a new entity in the first segment.

1 13. (Previously Presented) The method of Claim 2, said step of automatically adjusting
2 further comprising:

3 determining based on the usage whether a first amount of the storage space allocated
4 to a first segment is not currently used by the plurality of entities; and
5 if the first amount is not currently used, associating a new entity with the first amount
6 of the storage space.

1 14. (Currently Amended) The method of Claim 54, wherein:

2 a first entity of a plurality of entities is associated with a first segment of the plurality
3 of segments; and
4 said step of automatically adjusting further comprises increasing a size of the first
5 segment in response to a request from the first entity by allocating an
6 additional amount of the storage space to the first segment.

1 15. (Previously Presented) The method of Claim 14, said step of automatically adjusting
2 further comprising:

3 determining whether sufficient storage space is already allocated to the first segment
4 for storing undo information included in the request from the first entity; and
5 if it is determined that sufficient storage space is not already allocated to the first
6 segment, then performing said step of increasing the size of the first segment.

1 16. (Original) The method of Claim 15, wherein a sum of the additional amount and the
2 storage space already allocated to the first segment is sufficient for storing the undo
3 information included in the request from the first entity.

1 17. (Original) The method of Claim 15, wherein the additional amount is based on the
2 storage space already allocated to the first segment.

1 18. (Original) The method of Claim 14, wherein the additional amount is selected from a
2 plurality of predetermined amounts.

1 19. (Original) The method of Claim 14, said step of allocating the additional amount
2 further comprising:

3 determining whether the additional amount of the storage space is available in storage
4 space not currently allocated to the plurality of segments; and
5 if the additional amount of the storage space is available in storage space not
6 currently allocated to the plurality of segments, then obtaining the additional
7 amount of storage space from the storage space not currently allocated.

1 20. (Original) The method of Claim 14, wherein:

2 a set of one or more entities of the plurality of entities is alone associated with a
3 second segment of the plurality of segments; and

4 said step of allocating the additional amount further comprises:

5 determining whether the additional amount of the storage space is currently
6 allocated to the second segment of the plurality of segments and is not
7 used by the set of one or more entities; and

8 if the additional amount of the storage space is currently allocated to the
9 second segment and is not used by the set, then obtaining the
10 additional amount of storage space by de-allocating from the second
11 segment the storage space currently allocated to the second segment
12 and not used by the set.

1 21. (Original) The method of Claim 4 said step of monitoring usage in each period of
2 time further comprising the step of monitoring an amount of the undo information stored in
3 each period of time.

1 22. (Original) The method of Claim 4, said step of monitoring usage in each period of
2 time further comprising the step of monitoring a number of entities started in each period of
3 time.

1 23. (Original) The method of Claim 4, said step of monitoring usage in each period of
2 time further comprising the step of monitoring a maximum number of entities executing
3 concurrently in each period of time.

1 24. (Original) The method of Claim 4, said step of monitoring usage in each period of
2 time further comprising the step of monitoring a maximum duration in each period of time
3 among durations of queries terminating during the period of time, said queries using at least
4 some of the undo information stored in the storage space.

1 25. (Original) The method of Claim 14, wherein the additional amount is an extent of
2 contiguous storage space.

1 26. (Currently Amended) The method of Claim 54, the step of automatically adjusting
2 further comprising the steps of:

3 allocating unused amounts of ~~the~~ storage space to the plurality of segments in
4 response to receiving undo information from the plurality of entities; and
5 de-allocating unused amounts of the storage space from the plurality of segments
6 periodically.

1 27. (Original) A method for managing changes in a computer system, the method
2 comprising the steps of:

3 storing, in a storage space, undo information for removing changes that are being
4 made by a plurality of entities, wherein the undo information for each entity of
5 the plurality of entities is stored in a segment of a plurality of segments within
6 said storage space, and a first entity of the plurality of entities is associated
7 with a first segment of the plurality of segments, and a set of one or more
8 entities of the plurality of entities is alone associated with a second segment of
9 the plurality of segments;

10 monitoring usage of the storage space by the entities in each period of time for a
11 series of periods of time; and

12 automatically adjusting at least one of the number of segments in the plurality of
13 segments and the sizes of the plurality of segments based on the usage, said
14 step of automatically adjusting comprising:

15 determining whether usage has decreased over a predetermined time based at
16 least in part on the usage in one or more periods of time of the series of
17 periods of time;

18 if usage has decreased over the predetermined time, then shrinking a sum of

19 the sizes of the plurality of segments;

20 determining whether sufficient storage space is already allocated to the first

21 segment for storing undo information included in a request from the

22 first entity; and

23 if it is determined that sufficient storage space is not already allocated to the

24 first segment, then increasing the size of the first segment by allocating

25 an additional amount of the storage space to the first segment, said

26 step of allocating the additional amount comprising,

27 determining whether the additional amount of the storage

28 space is available in storage space not currently

29 allocated to the plurality of segments, and if the

30 additional amount of the storage space is available in

31 storage space not currently allocated to the plurality of

32 segments, then obtaining the additional amount of

33 storage space from the storage space not currently

34 allocated; and

35 if the additional amount of the storage space is not available in

36 storage space not currently allocated to the plurality of

37 segments, then determining whether the additional

38 amount of the storage space is currently allocated to the

39 second segment of the plurality of segments and is not

40 used by the set of one or more entities, and if the

41 additional amount of the storage space is currently

42 allocated to the second segment and is not used by the
43 set, then obtaining the additional amount of storage
44 space by de-allocating from the second segment the
45 storage space currently allocated to the second segment
46 and not used by the set.

1 Claims 28-53 (Canceled).

1 54. (Previously Presented) A machine implemented method comprising the steps of:
2 storing undo information for removing changes that are being made to data in a
3 storage area that includes a plurality of segments, wherein application of the
4 undo information returns the data to which the changes were made to a state
5 of the data that existed prior to the changes;
6 wherein each segment of the plurality of segments is a partition of said storage area,
7 and is pre-allocated for storing undo information for entities to which that
8 segment will be assigned;
9 using each segment of the plurality of segments as a circular buffer; and
10 automatically adjusting a size of the storage area based on usage of the plurality of
11 segments.

1 55. (Previously Presented) The method of Claim 54 wherein the step of automatically
2 adjusting is performed by at least adding a segment to the plurality of segments.

1 56. (Previously Presented) The method of Claim 54, wherein the step of automatically
2 adjusting is performed by at least increasing a size of at least one of the plurality of segments.

1 57. (Previously Presented) The method of Claim 54, wherein the step of automatically
2 adjusting includes at least de-allocating storage space in one segment of the plurality of
3 segments, wherein the one segment includes other storage space that is being used by one or
4 more entities.

1 58. (Currently Amended) The method of Claim 57, further comprising the step of
2 determining that the storage space is no longer being used by the one ~~or~~ of the plurality of
3 segments; wherein the step of de-allocating is performed in response to the step of
4 determining.

1 59. (Previously Presented) The method of Claim 57, wherein the step of automatically
2 adjusting further includes at least allocating the storage space to another of the plurality of
3 segments.

1 60. (Previously Presented) The method of Claim 54, further comprising assigning one or
2 more entities to a segment based on the usage of the plurality of segments.

1 61. (Previously Presented) The method of Claim 54 further comprising collecting
2 statistical information to determine the usage of the plurality of segments.

1 62. (Previously Presented) The method of Claim 54, further comprising storing
2 information associated with the usage of the plurality of segments.

1 63. (Previously Presented) The method of Claim 62, wherein the information associated
2 with the usage is stored in an array.

1 64. (Previously Presented) The method of Claim 62, wherein the storing of the
2 information associated with the usage is performed periodically.

1 65. (Previously Presented) The method of Claim 54, wherein the plurality of segments
2 includes more than two segments, and the method further comprises the step determining the
3 usage of each the plurality of segments; and assigning an entity to one of the plurality of
4 segments based on the step of determining.

1 66. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 2.

1 67. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 3.

1 68. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 4.

1 69. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 5.

1 70. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 6.

1 71. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 7.

1 72. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 8.

1 73. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 10.

1 74. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 11.

1 75. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 12.

1 76. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 13.

1 77. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 14.

1 78. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 15.

1 79. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 16.

1 80. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 17.

1 81. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 18.

1 82. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 19.

1 83. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 20.

1 84. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 21.

1 85. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 22.

1 86. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 23.

1 87. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 24.

1 88. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 25.

1 89. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 26.

1 90. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 27.

1 91. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 54.

1 92. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 55.

1 93. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 56.

1 94. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 57.

1 95. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 58.

1 96. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 59.

1 97. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 60.

1 98. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 61.

1 99. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 62.

1 100. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 63.

1 101. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 64.

1 102. (Previously Presented) A tangible computer-readable medium carrying one or more
2 sequences of instructions which, when executed by one or more processors, causes the one or
3 more processors to perform the method recited in Claim 65.